



| **Carbon-IQ**

Knowsley MBC Highways Dept. Carbon Management System.

Carbon-IQ Annual report 2023

Delivering world class carbon
management





| Carbon-IQ



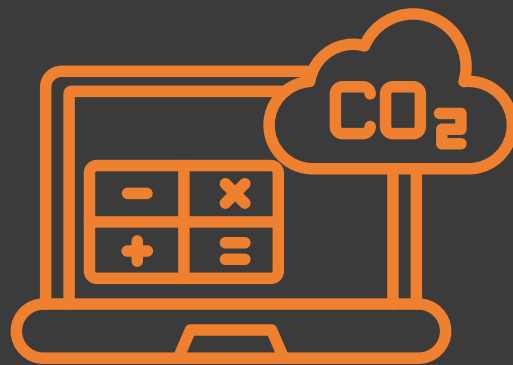
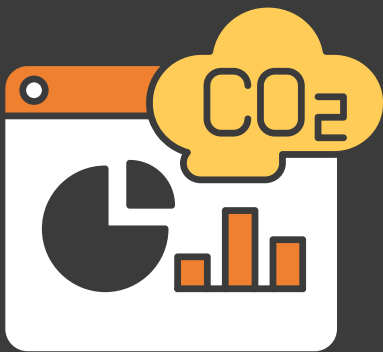
LCRIG

Asphalt-IQ was awarded the LCRIG Innovation award for "Green Estate". The cash prize is funding a pilot project with the selected UK Local Authority, Knowsley MBC





The Problem



The highways industry is committed to reaching "Net Zero" by 2040 but currently there is no single uniform definition and carbon calculation methodology for the asphalt industry.

The carbon calculators that are in the market are all excel based spreadsheets which are not capable of providing robust carbon emissions records and a geolocated carbon audit capability



Carbon-IQ

Our Solution

Carbon-IQ is an integrated solution which enables the carbon emissions of an asphalt laying operation to be calculated and recorded directly from site by the supervisor or foreman.

Features

- ✓ Smartphone app enabled
- ✓ Intuitive - no training required
- ✓ For every project - motorways to pothole repairs
- ✓ Fully customised - plants, mixes, equipment
- ✓ Exact transportation distances calculated

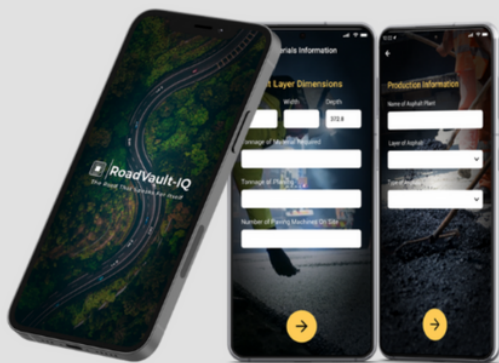
Benefits

- ✓ Immediate compliance with PAS 2080-23
- ✓ Carbon recorded directly from the jobsite
- ✓ The most accurate calculation system available
- ✓ All records generated in less than 60 secs
- ✓ Single licence - unlimited users





Carbon-IQ



Our Technology



Carbon-IQ



Carbon-IQ

Carbon-IQ is a smartphone app which enables the calculation and GPS recording of carbon emissions from road surfacing works. Activated by the Smart A-Tag and completed in less than 60secs, Carbon-IQ is the fastest and most practical asphalt carbon calculator on the market

The Smart A-Tag

The patented "Smart A-Tag" enables the road to "Speak for itself with a unique digital identity and GPS location creating the opportunity to calculate the Co2 emissions of the asphalt construction scheme.

The SmartCard

Designed to offer "Tap and Go" Functionality, the Asphalt-IQ SmartCard is primarily aimed at multi location projects such as pothole repair or patch reinstatements. Distances are calculated between each site and a total transportation carbon value is auto generated.



Carbon-IQ

CARBON-IQ COMPLIANCE WITH UK HIGHWAYS CARBON REPORTING STANDARDS

There are two main standards in use that provide methods for quantifying organisational Greenhouse Gas (GHG) emissions. The first of these is BS EN ISO 14064-1 (hereafter referred to as ISO 14064) and the accompanying ISO/TR 14069 which provides specific guidance on applying ISO 14064. The second is the *Greenhouse Gas Protocol* (hereafter referred to as the GHG Protocol) and has accompanying documents which provide more detail on quantifying emissions from supply chains.

In addition, the UK's *Environmental Reporting Guidelines* (ERG) are broadly based on ISO 14064 and the GHG Protocol but are less detailed. Finally, PAS 2060 enables organisations to demonstrate carbon neutrality. Within PAS 2060, ISO 14064, the GHG Protocol and the ERG are listed as the three standards that can be used by organisations to provide methods to quantify GHG emissions. PAS 2080:2023 offers an industry specific standard by specifying the requirements for the management of whole life carbon in buildings and infrastructure. In general, there is significant overlap between ISO 14064 and the GHG Protocol.

Title	Carbon Calculation & Accounting Standard
Release Date	27th September 2023
Version	Rev. 4.5
Release	Release Candidate 4
Authors	Simon Wilson Karen Farquharson Andy Martin
Restrictions	Valid Members Only

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Carbon Calculation & Accounting Standard (CCAS)

Carbon Reporting Guidance
for Local Highways Authorities
(GHG Scopes 1, 2 & 3)

Registered in England & Wales
Reg No. 10425546

PAS 2080:2023

Carbon management in buildings and infrastructure



Construction
Leadership
Council

The Green Construction Board



bsi.



CARBON-IQ COMPLIANCE WITH UK HIGHWAYS CARBON REPORTING STANDARDS

Carbon Calculation & Accounting Standard (CCAS) Carbon Reporting Guidance for Local Highways Authorities 2023 & PAS 2080:2023

Figure 3: Life Cycle Stages (GHG Emissions) Module Assignments & Quantification)

Life Cycle Stages	Product Stage				Construction Stage		Use Stage							End Of Life			
							Asset Maintenance					Operations					
	A0	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
Modules (EN15978 & PAS 2080)	Studies & Consultations	Raw Materials Supply	Transport	Manufacturing	Transport	Construction	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Demolition	Transport	Waste Processing	Disposal

Life Cycle Stages Relevant to
Knowsley MBC Highways Dept
Carbon Management System

Benefits & Loads Beyond The System Boundary
D
Reuse, Recovery & Recycling

Category Scoping & Mapping (Based on ISO 14064-1/GHG Protocols)

Inventory categories for ISO 14064-1 are provided in ISO/TR 14069. These have been reviewed in the context of the highways sector, and their inclusion or exclusion is explained in *Appendix E: Included & Excluded GHG Categories (ISO 14064-1)*.

Modules A1-A5 are covered by Carbon-IQ



CARBON-IQ COMPLIANCE WITH UK HIGHWAYS CARBON REPORTING STANDARDS

Carbon Calculation & Accounting Standard (CCAS) Carbon Reporting Guidance for Local Highways Authorities 2023 & PAS 2080:2023

Categories & Subcategories		Scope 1	Scope 2	Scope 3
Premises & Sites	Office & Depot Based Activities	✓	✓	✓
Vehicles & Plant	Vehicle Use	✓	✓	✓
	In-Use Energy of Plant	✓		✓
	Transport of Plant & Equipment	✓	✓	✓
Staff & Contractors	Business Travel During Work	✓	✓	✓
	Commuting			✓
	Home Working			✓
Purchased Products, Services, Transport & Waste	Purchased Materials & Products			✓
	Purchased Services			✓
	Transport of Materials	✓	✓	✓
	Transport of Waste	✓		✓
	Waste Disposal	✓		✓

Categories in Red are covered by Carbon-IQ



CARBON-IQ COMPLIANCE WITH UK HIGHWAYS CARBON REPORTING STANDARDS

Carbon Calculation & Accounting Standard (CCAS) Carbon Reporting Guidance for Local Highways Authorities 2023 & PAS 2080:2023

Method	Category Group	Category Description(s)
Carbon Accounting: Inventory Based Reporting	Premises & Sites (Offices & Depots)	Emissions from combusted fuels.
		Emissions from purchased electricity.
		Fugative emissions from air conditioners and refrigeration units.
	Vehicles & Plant	Vehicle use (including supply chain and pool vehicles).
		In-use energy of plant.
	Staff & Operatives	Travel during work (business travel using personal vehicles, i.e. "grey fleet miles"). Staff commuting to an assigned place of work.
		Home working.
	Purchased Goods & Services (Materials, Services, Transport, Water & Waste)	Purchased goods and materials (direct and supply chain).
		Purchased services (e.g. design and consultancy services).
		Purchased transport services (materials and waste).
		Purchased waste processing and disposal.

Categories in Red are covered by Carbon-IQ



CARBON-IQ COMPLIANCE WITH UK HIGHWAYS CARBON REPORTING STANDARDS

Carbon Calculation & Accounting Standard (CCAS) Carbon Reporting Guidance for Local Highways Authorities 2023 & PAS 2080:2023

Carbon Management Process

Use the following process to create a schedule of functions and activities to include within the carbon reporting boundary:

- ✓ **1. Create a schedule of LHA functions and activities.**
 - a. A standard schedule of typical highways activities is provided in Appendix D.
- ? **2. Ensure that any excluded functions and activities are accounted for elsewhere within the authority.**
 - a. This is usually reviewed and verified with the CCMRT.
- ✓ **3. Identify whether the activity is undertaken in-house or outsourced.**
 - a. Scope 1, 2 and 3 emissions.
- ✓ **4. Identify those functions and activities where a detailed activity based analysis will (may) be undertaken.**
- ✓ **5. Identify the scopes of emissions resulting from each activity.**
 - a. GHG scope 1, 2, and or 3.
- ✓ **6. Record the *responsible party* for carbon reporting for each activity selected for more detailed analysis.**

Typically, activities that are carried out in-house by the LHA will produce **scope 1 and 2** emissions. Any products or services purchased to support directly delivered services will result in **scope 3** emissions. All activities which are outsourced or devolved (i.e., completed by a third-party or supply chain partner) will produce **scope 3** emissions.



CARBON-IQ COMPLIANCE WITH UK HIGHWAYS CARBON REPORTING STANDARDS

Carbon Calculation & Accounting Standard (CCAS) Carbon Reporting Guidance for Local Highways Authorities 2023 & PAS 2080:2023

Ratio Indicators & Benchmarking

When looking to compare performance and benchmark authority data, it is important to consider intensity ratios. Intensity ratios are used to obtain context in relation to the overall picture, enabling:

- The comparison of data across LHAs.
- The evaluation of performance over time.

In general, the ratios used should be selected to help improve understanding and clarify interpretation of performance for stakeholders. This guidance proposes two baseline ratio indicators for LHAs:

$$\frac{\text{Total Emissions (kgCO}_2\text{e)}}{\text{Length of LHA Network}} = \text{kgCO}_2\text{e per mile (or kilometre)}$$

And

$$\frac{\text{Total Emissions (kgCO}_2\text{e)}}{\text{Highways Budget (£)}} = \text{kgCO}_2\text{e per £ spent on highways services}$$

When benchmarking, these ratios require like-for-like comparisons regarding boundaries (i.e., the activities within the boundary and which activities are assigned to scopes 1, 2 and 3). As this is likely to vary significantly between LHAs, these ratios are best used to monitor internal performance.



KNOWSLEY MBC HIGHWAYS DEPARTMENT CARBON CALCULATION – ANNUAL REPORT

Number of Records

For the period 1st Jan 2023 - 31st December 2023 , 537 individual repair locations were stored and recorded
15 of these were paver laid surfacing locations (tags)
2022 tons of asphalt were laid in the surfacing locations
522 were pothole/patching locations
There were 104 individual recorded shifts of pothole/patching
The average number of potholes/patches repaired per shift was 5

Carbon Totals

The total carbon emissions for the locations reported were 100 tons
86 tons were from paver laid surfacing locations (tags)
14 tons were from pothole/patching locations

Analytics

Average carbon emissions per paver surfacing site 5.73 tons
Average carbon emissions per pothole patching location 27 kgs
Average carbon emissions per pothole/patching days 134 kgs

Carbon Equivalency and Impact

The total emissions for the work conducted are equivalent to

- Using 517,100 kWh of electricity, which could power 183 mid-terrace homes or flats for about a year or 118 detached houses based on UK average electricity consumption.
 - Running 83 small petrol cars like a Peugeot 107, or Citroen C1 driving for approximately the average mileage of 6,800 miles per year in the United Kingdom.
 - Or running 53 larger cars, such as the BMW 5 series or Audi A5 or A6
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KNOWSLEY MBC HIGHWAYS DEPARTMENT CARBON CALCULATION – ANNUAL REPORT

Data Observations

The data set (number of submitted records) for the pothole / patching operation is robust and representative and can be used with a high degree of confidence for benchmarking and trend analysis

The data set (number of submitted records) for paver laid surfacing operations is small and may not be statistically representative for benchmarking and trend analysis.

Recommendations

- All surfacing activities should be recorded in order to give a more complete data set
- 2024 should be used as the “benchmark” Year as per Carbon Calculation & Accounting Standard (CCAS) Carbon Reporting Guidance for Local Highways Authorities 2023 & PAS 2080:2023
- Knowsley MBC Highways Dept should create an amalgamated annual carbon report including office based scope 1 and 2 emissions and Carbon-IQ
- Due to the high proportion of carbon emissions generated and recorded by the hot asphalt materials , measures should be implemented in 2024 to utilise lower carbon alternatives (warm mix,bio binders, cold mixes etc) in order to have the greatest impact
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Final Thoughts

- With the early adoption of Carbon-IQ in 2023, Knowsley MBC currently has the most advanced local highways carbon reporting and management system in the UK.
 - Addition of accounting based scope 1 and 2 carbon analysis for non site activities (office energy, employee travel to work etc) will enable a CCAS compliant system without the need to employ any extra staff
 - Asphalt-IQ is prepared to offer (at no additional cost) to assist and facilitate the production of the CCAS report
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